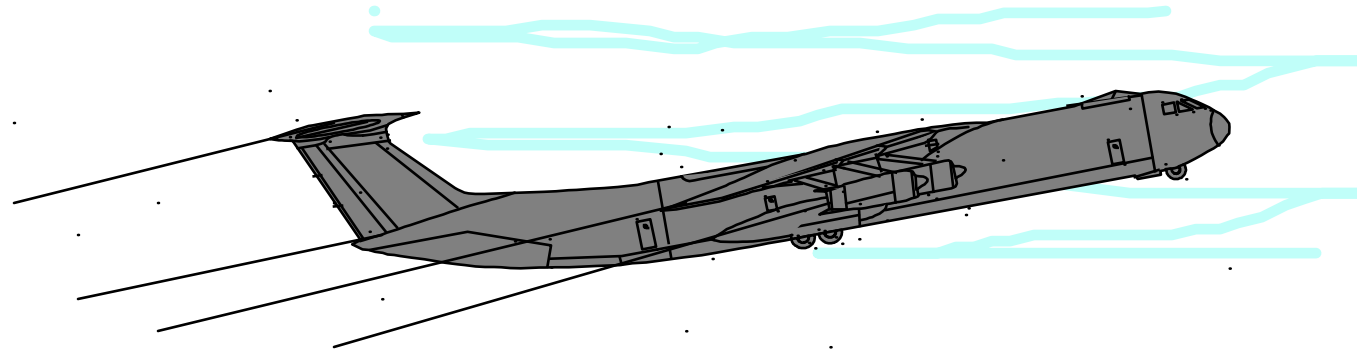
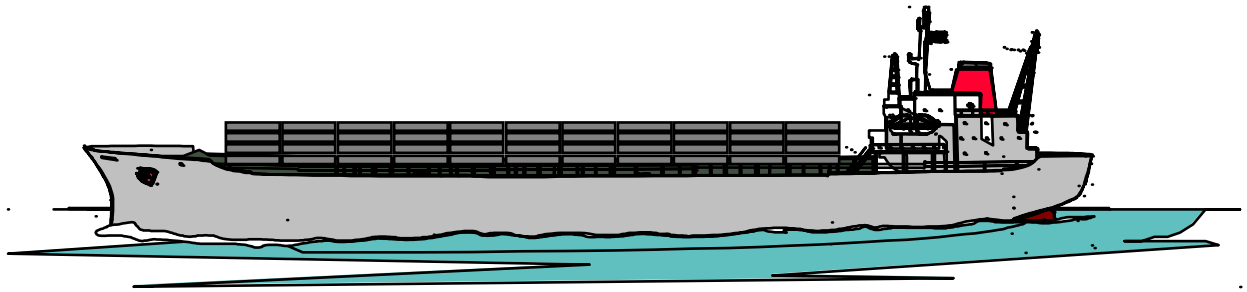
USMEDCOM



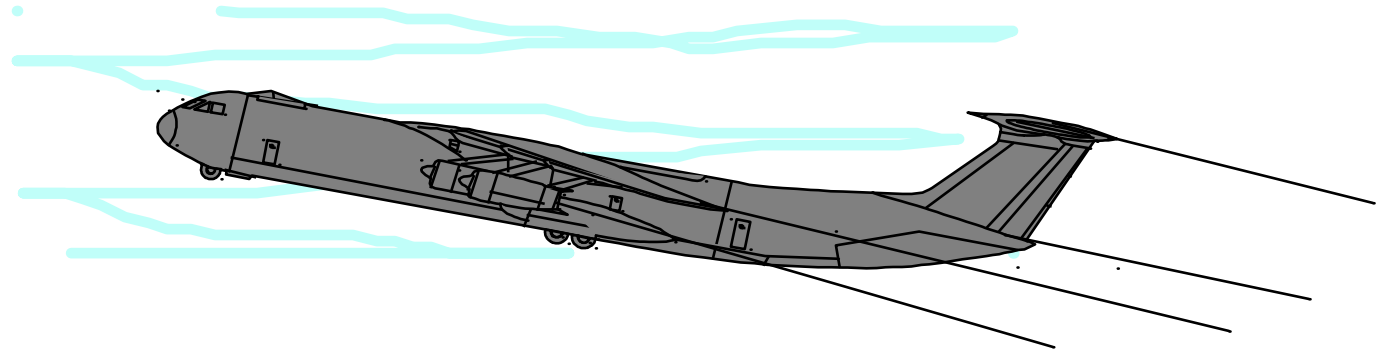
CALCULATIONS



STRADPC

USMEDCOM

AIRLIFT CONSIDERATIONS

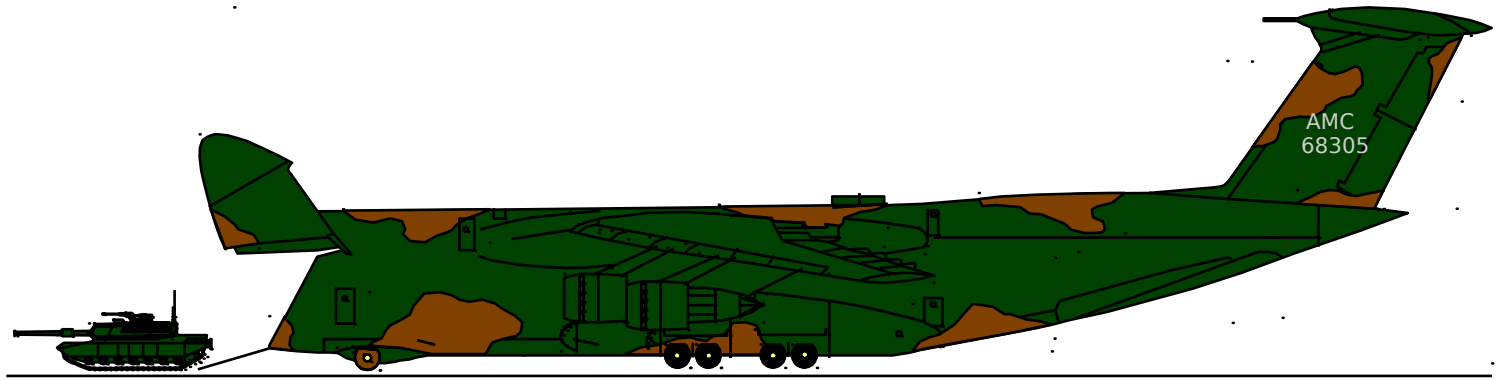


CALCULATING FORCE CLOSURE BY AIRLIFT

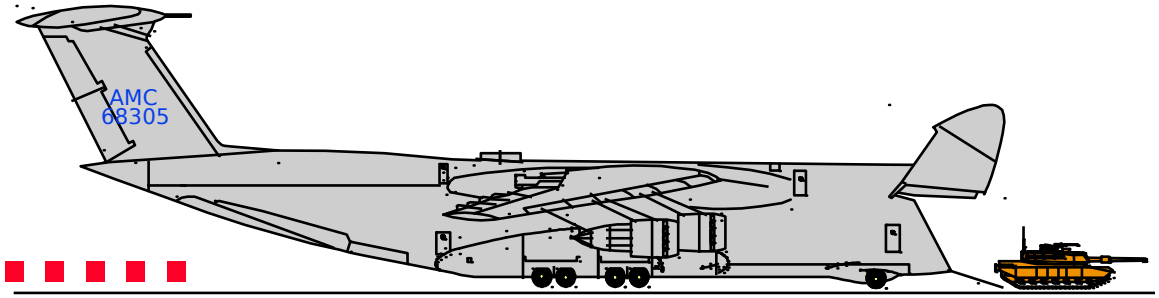
USMEDCOM

IN ORDER TO ESTIMATE FORCE CLOSURE BY AIR, DETERMINATION MUST BE MADE OF RESOURCES, AIRFIELD CAPABILITIES, AND TIME FACTORS INHERENT IN AIR LIFTING A FORCE INTO THEATER.

CARGO & PAX ARE CALCULATED SEPARATELY



MOVEMENT CALCULATIONS.....



☑ **DETERMINATION OF THE TOTAL MOVEMENT REQUIREMENT. THIS IS A DESCRIPTION OF THE UNIT BEING MOVED AND RESULTS IN A DETERMINATION OF THE NUMBER OF MISSIONS REQUIRED...BOTH CARGO AND PAX.**

÷ =

CARGO REQUIREMENT **AVG. PAYLOAD**

MISSIONS

REQUIRED

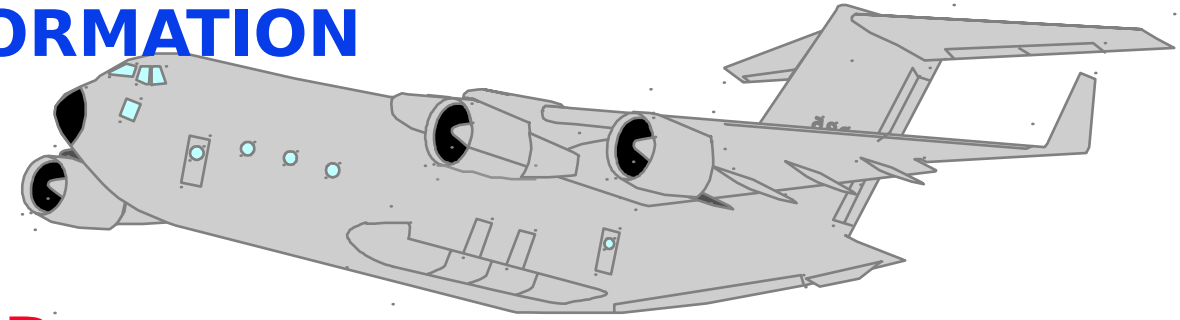
TOTAL PAX — PAX ON CARGO MISSIONS ÷ AVG. PAYLOAD = MISSI REQUIRED

AND THEREFORE, ONCE YOU'VE WORKED BOTH…….

CARGO MISSIONS + PAX MISSIONS = TOTAL MISSI REQUIRED

☑ THEN WE GOTTA FIGURE OUT THE "CYCLE TIME."

☑ CALCULATING “CYCLE TIME” FOR EACH AIRCRAFT TYPE. TO DO THIS WE NEED SOME INFORMATION AND CALCULATIONS:



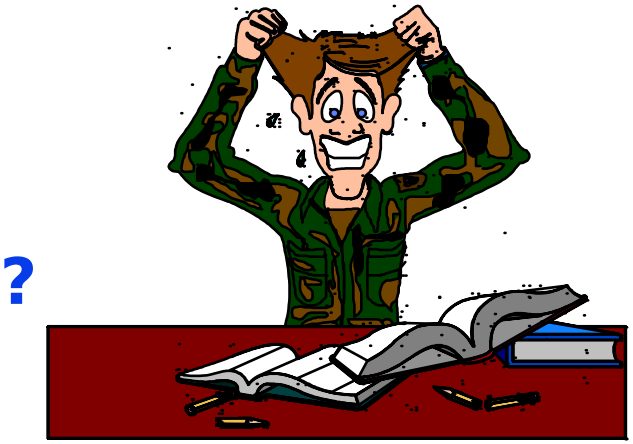
.....BLOCK SPEED

.....ACTIVE ROUTE FLYING TIME (ARFT)

.....ACTIVE ROUTE GROUND TIME (ARGT)

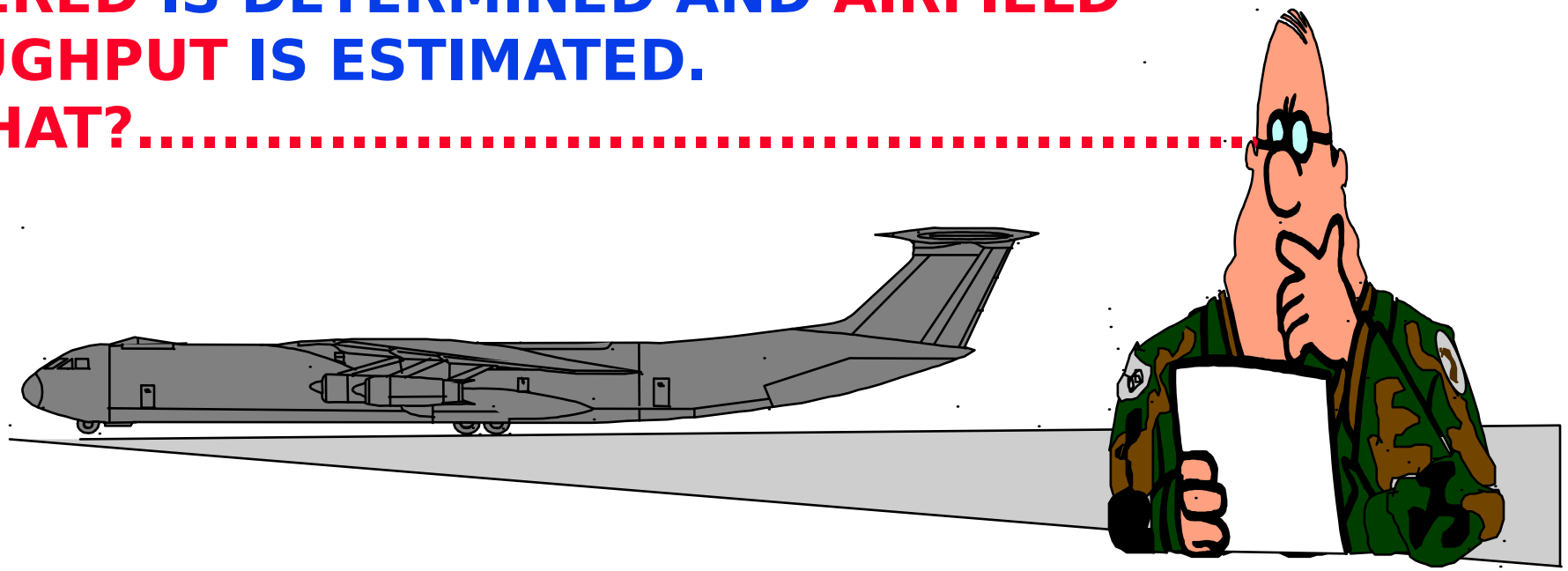
.....ROUND TRIP FLYING TIME (RTFT)

.....ROUND TRIP GROUND TIME (RTGT)

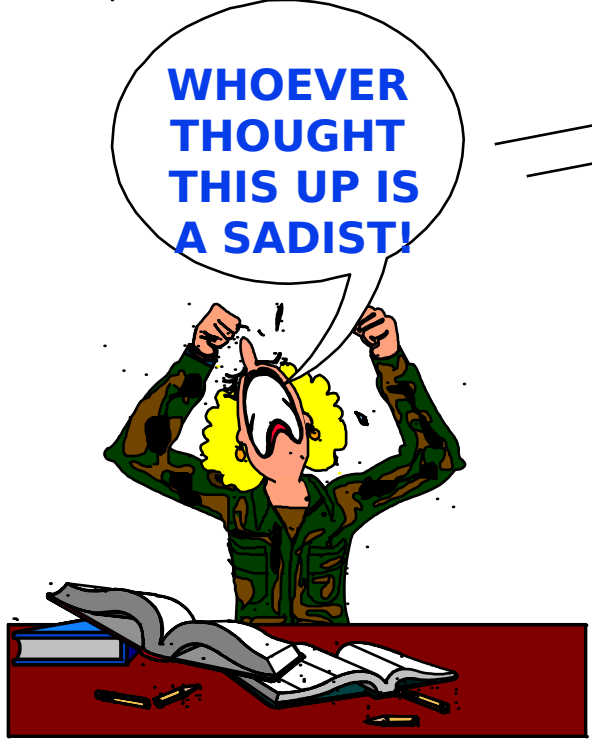


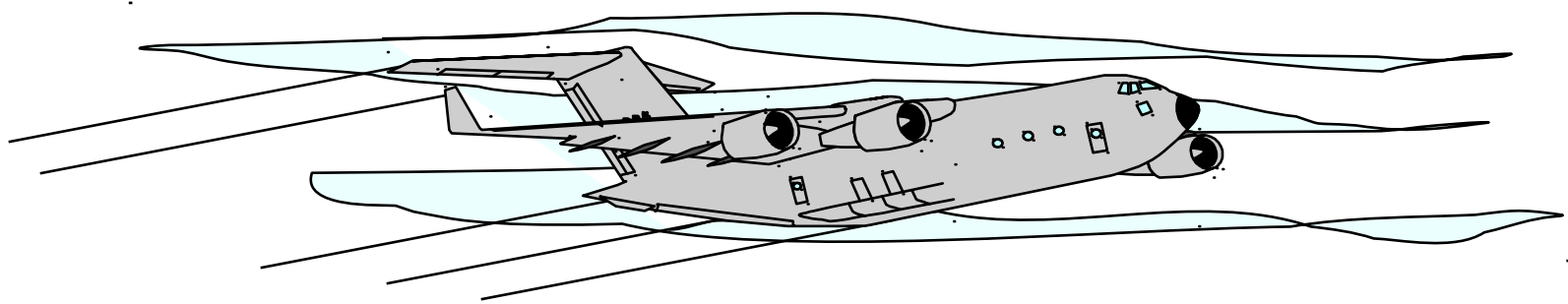
ARE YOU GETTING ALL THIS????????

ONCE THIS IS DONE, THE TONS PER DAY BY AIRCRAFT TYPE AND THE TOTAL TONS DELIVERED IS DETERMINED AND AIRFIELD THROUGHPUT IS ESTIMATED.
GOT THAT?.....



Okay, LET'S JUST WALK THROUGH THESE CALCULATIONS
....TO SEE HOW ALL THIS HAPPENS





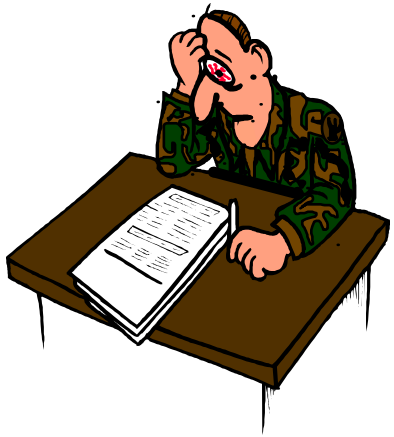
CALCULATE :
A BRIGADE OF 3,500 PERSONNEL AND

SHORT TONS OF CARGO WILL DEPART A CONUS APOE. THE DISTANCE TO THE APOD IS 4200 N/MILES. THE ONLY AIRCRAFT AVAILABLE IS THE C-141.

45 141S HAVE BEEN APPORTIONED. THE 141s CAN CARRY 120 SOLDIERS OR 19 SHORT TONS OF CARGO AND 22 PAX. THE BLOCK SPEED IS 399 KNOTS. THE LOAD/UNLOAD TIME FOR THE 141 IS 2 HOURS AND 15

.....DETERMINE CARGO REQUIREMENTS:
THIS IS CALCULATED BY THE FORMULA..

CARGO REQUIREMENT ÷ AVG. PAYLOAD = MISSIONS REQUIRED



800 ÷ 19 = 43

HOW ABOUT PASSENGERS.....?

PAX REQUIREMENT ÷ AVG. PAYLOAD = MISSIONS REQUIRED

BUT.....

TOTAL PAX — PAX ON CARGO MISSION ÷ AVG. PAYLOAD = MISSIONS REQUIRED

TOTAL PAX — PAX ON CARGO MISSION ÷ AVG. PAYLOAD = MISSIONS REQUIRED

3500 PAX — 946 PAX ON CARGO MISSION ÷ 120 = 22 MISSIONS REQUIRED

CARGO MISSIONS + PAX MISSIONS = TOTAL MISSIONS

43 + 22 = 65 TOTAL MISSIONS

☑ **"ACTIVE ROUTE FLYING TIME (ARFT)" IS THE TIME FROM**
ORIGIN TO DESTINATION, NOT INCLUDING ANY GROUND

THIS IS CALCULATED BY THE FORMULA..

DISTANCE ÷ BLOCK SPEED = "ARFT"

NOTE: "BLOCK SPEED" IS DETERMINED FROM USAF TABL
GIVING AVERAGE SPEEDS.... OVER SPECIFIED DISTANCES
BY AIRCRAFT TYPE

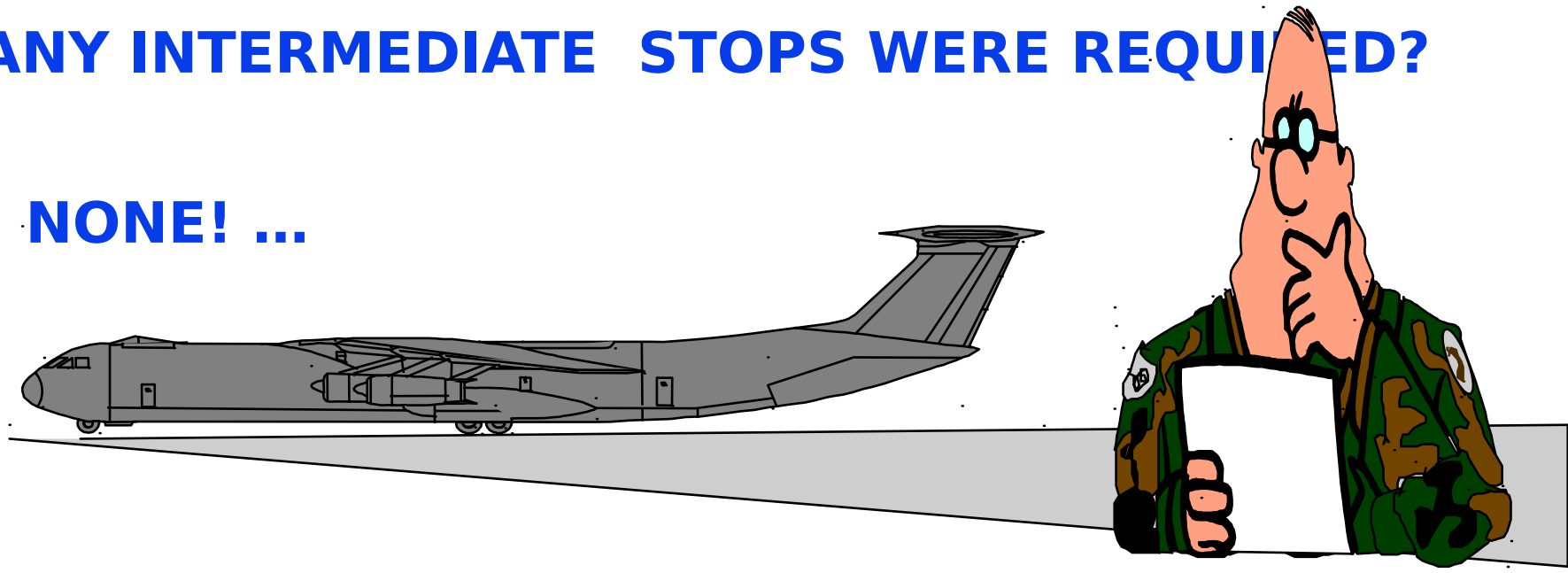
4200 ÷ 399 = 10.52

(IF THERE ARE MULTIPLE LEGS, THEY WILL BE CALCULATE
AND ADDED TOGETHER)

☑ **“ACTIVE ROUTE GROUND TIME (ARGT)” IS THE CUMULAT**
GROUND TIME OF ALL THE INTERMEDIATE STOPs

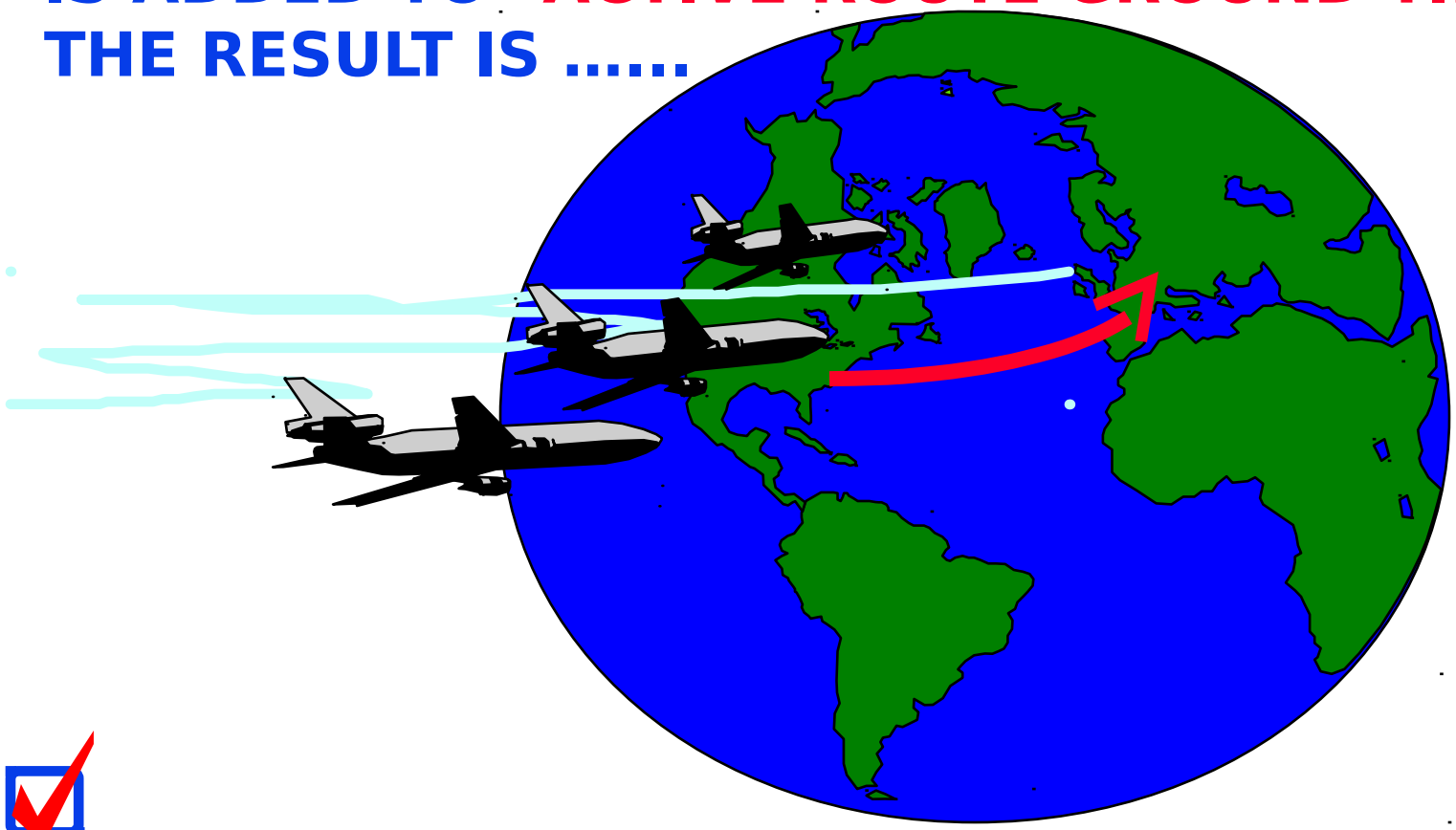
HOW MANY INTERMEDIATE STOPS WERE REQUI ED?

NONE! …



BUT IF THERE HAD BEEN, THEY WOULD HAVE BEEN ADDED TOGETHER TO GIVE THE “ARGT.”

WHEN “ACTIVE ROUTE FLYING TIME (ARFT)”
IS ADDED TO “ACTIVE ROUTE GROUND TIME (ARGT)”
THE RESULT IS ……

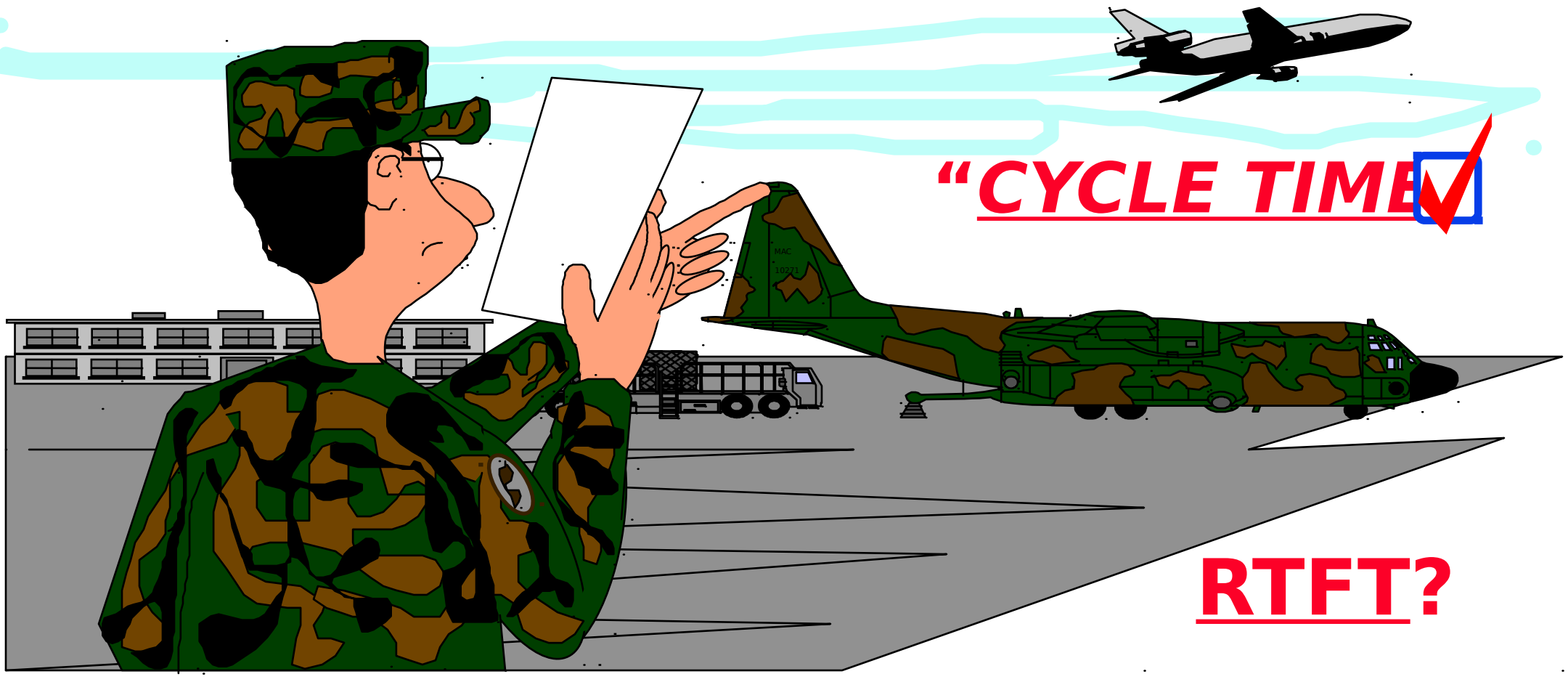


“TIME TO ARRIVAL” ..THE TIME REQUIRED FOR CARGO A
PASSENGERS TO ARRIVE AT THE DESTINATION, INCLUDI
ALL ENROUTE GROUND TIME

OKay, LET'S LOOK AT DETERMINING "CYCLE TIME"

"ROUND TRIP FLYING TIME (RTFT)"

"ROUND TRIP GROUND TIME (RTGT)"



☑ **ROUND TRIP FLYING TIME, "RTFT" IS THE ACCUMULATED FLIGHT TIME FROM START PO TO THE DISCHARGE SITE AND BACK TO THE POINT OF ORIGIN.**

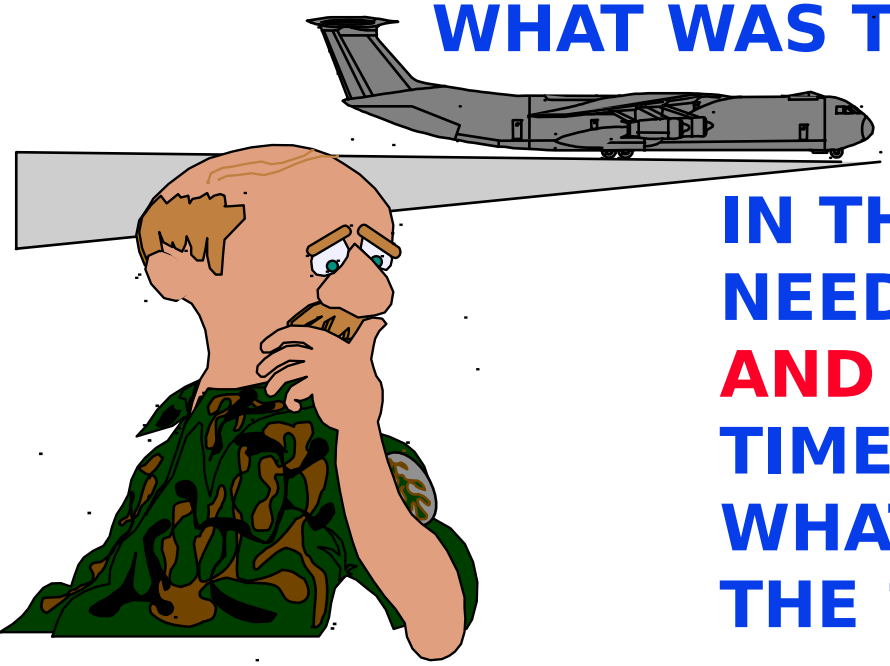
IN OUR EXAMPLE, WE HAD A "NON-STOP" LEG OF 4200 MILES. IN THIS CASE, OUR "ARFT" IS DIVIDED BY THE "BLOCK SPEED" AND DOUBLED TO GET THE "RTFT."

RTFT = 21.06 HOURS

WHAT IF THERE WERE MULTIPLE ENROUTE STOPS?

ROUND TRIP GROUND TIME, "RTGT," IS THE ACCUMULATED GROUND TIME FROM START POINT TO DISCHARGE SITE AND BACK TO THE POINT OF ORIGIN.

WHAT WAS THE "ARGT" FOR OUR EXAMPLE?



IN THE EXAMPLE THEN, WE WILL NEED THE ORIGIN, DESTINATION, AND RETURN DESTINATION GROUND TIMES TO CALCULATE THE RTGT. WHAT IS THE GROUND TIME FOR THE 141s?

GROUND TIME ..... 2 HRS AND 15 MIN EA

RTGT ..... 4 HRS AND 30 MIN

NOW WE CAN DETERMINE THE CYCLE TIME!

FORMULA:

CYCLE TIME = RTFT + RTGT

WHAT IS THE RTFT? 21.06 HOURS

WHAT IS THE RTGT? 6.75 HOURS

WHAT IS THE CYCLE TIME? 27.81 HOURS

Okay ….. DETERMINING "CLOSURE" IS NEXT

HANG ON **….WE'RE ALMOST THERE!!!** **DEFINE CLOSURE??**

"THE PROCESS OF A UNIT ARRIVING AT SPECIFIED LOCATI

IT BEGINS WITH THE FIRST ELEMENT ARRIVING AT THE APO
THROUGH INTERMEDIATE STOPS, TO THE APOD. IT CONCL
WITH THE LAST ELEMENT ARRIVES AT THE APOD.

Okay …
WHATS THE FORMULA
FOR "CLOSURE?"

"CLOSURE" =

REQUIREMENTS X RTFT ÷ AVG PAYLOAD X # OF AIRCRAFT X "USE" RATE

OR....

$$\text{CLOSURE} = \frac{\text{REQUIREMENT X RTFT}}{\text{AVG. PAYLOAD X AIRCRAFT X USE}}$$

BUT, WAIT! ....WHY ARE WE USING RTFT? WHY "ARRIVAL TIME"? .....WHY NOT "CYCLE TIME" OR .....WHY NOT SOMETHING ELSE?
DOES THE "USE" RATE FACTOR THAT IN

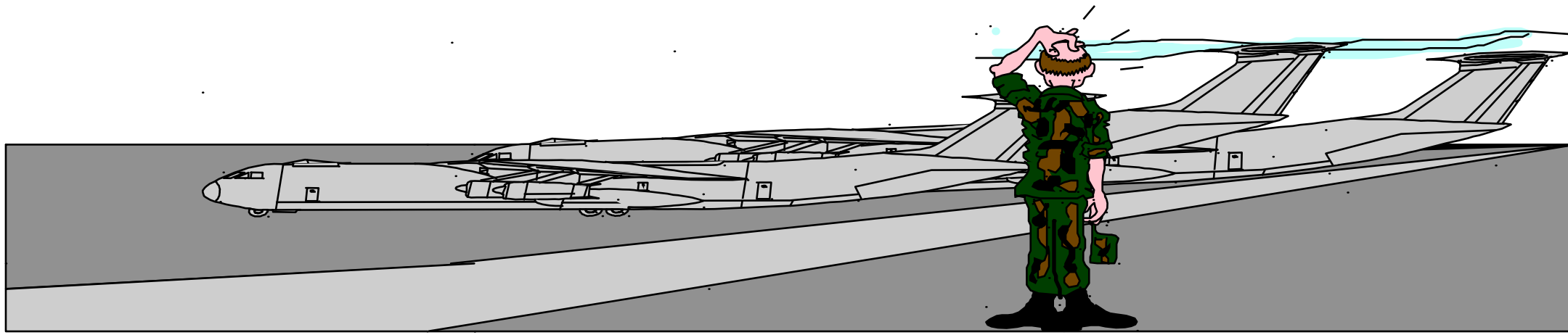
YUP….IT DOES

$$\text{CLOSURE} = \frac{\text{REQUIREMENT X RTFT}}{\text{AVG. PAYLOAD X AIRCRAFT X USE}}$$

BUT …. HERE'S ANOTHER QUESTION
WHAT IF THIS IS A BIG OPERATION AND WE ARE "SURGING" THE THEATER???
WHAT CHANGE IS MADE IN THE PLANNING FORMULA?

LET'S LAY OUT THE INFO.....

TOTAL MOVEMENT REQUIREMENT	800 = ST CARGO
	= 3500 PERSONNEL
DISTANCE	= 4200 MILES
AIRCRAFT	= 45 C-141s
PAYLOAD	= 120 SOLDIERS or
	19 ST + 22 PAX
BLOCK SPEED	= 399 KTS
LOAD (UNLOAD) TIME	= 8 HRS 15 MIN
RTFT	= 21.06 HOURS
USE RATE	= 7.4



OKay ..... LET'S SEE IF WE CAN PUT IT TOGETHER

$$\text{CLOSURE} = \frac{800 \quad T \times 21.06 \quad T}{19 \text{ SHORT TONS} \quad 45 \quad 7.4 \quad \text{SE}}$$

"CLOSURE"

FOR OUR EXAMPLE:

FOR CARGO:

$$\text{CLOSURE} = \frac{800 \text{ X } 21.06}{19 \text{ X } 45 \text{ X } 7.4}$$

CLOSURE = 2.66 DAYS

Okay ..... HOW MANY PAX ON THESE FLIGHTS? FIGURE MAX ON AVAILABILITY.

HOW MANY MORE MUST BE ACCOUNTED FOR?

NOW, WORK OUT CLOSURE FOR PAX

FOR PASSENGERS:

$$\text{CLOSURE} = \frac{? \times 21.06}{120 \times 45 \times 7.4}$$

HOW MANY PAX WERE ON THE CARGO FLIGHT? **990**

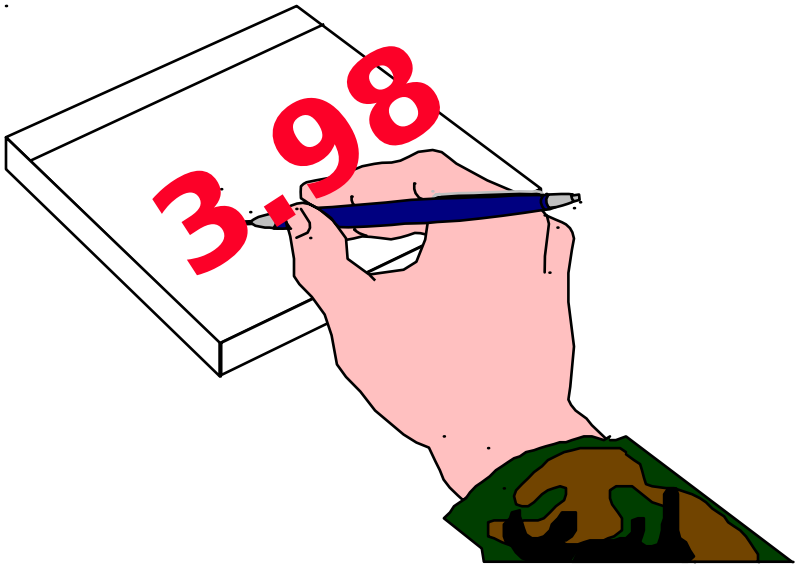
HOW MANY MORE MUST BE FLOWN IN? **2510**

$$\text{CLOSURE} = \frac{2510 \times 21.06}{120 \times 45 \times 7.4}$$

CLOSURE = 1.32 DAYS

ADDING ‘EM TOGETHER GIVES TH

TOTAL CLOSURE ESTIMATE… OR



OKay, NOW FOR GRINS LET’S FIGURE

…… FLEET CAPABILITY……

$$\frac{\text{AVG. PAYLOAD} \times \text{AIRCRAFT} \times \text{USE}}{\text{RTFT}} = \text{FLEET CAPABILITY}$$

SO WHAT IS THE FLEET CAPABILITY?

NOW …LET'S WORK ON AIRFIELD THROUGHPUT CAPABILITY

USMEDCOM

AIRFIELD THROUGHPUT CAPABILITY

CAPABILITIES FOR ALL AIRFIELDS IN THE DEPLOYMENT MUST BE ASSESSED. IN PLANNING, ENROUTE FIELDS ARE ASSUMED TO HAVE HIGHER THROUGHPUT THAN ONLOAD/OFFLOAD LOCATION

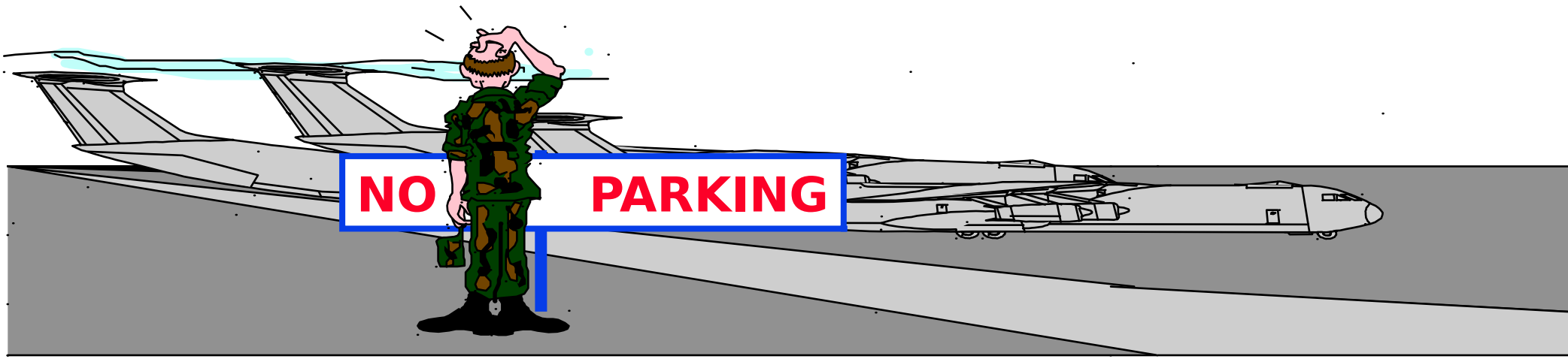
REMEMBER "MOG?" …ALTHOUGH THAT LITERALLY MEANS "PARKING SPACE" …THE REAL FACTOR IS CALLED …… . "WORKING MOG"

AIRFIELD THROUGHPUT CAPABILITY…

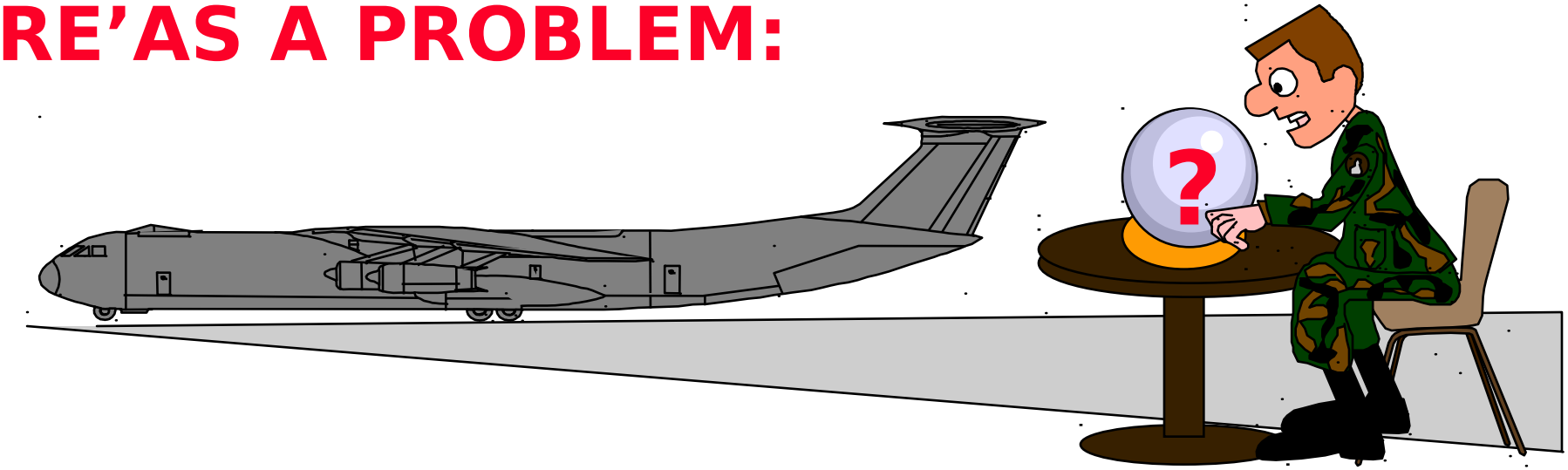
IT IS NECESSARY TO LOOK AT AIRFIELD THROUGHPUT CAPABILITY TO SEE IF A FIELD WILL LIMIT AN OPERATION.

THIS IS THE FORMULA THAT IS USED TO DETERMINE AN AIRFIELD'S TRHROUGHPUT CAPABILITY

$$\frac{\text{MOG X AVERAGE PAYLOAD X OP'N HOURS}}{\text{GROUND TIME}} \text{ X "QUEUING EFFICIENCY}$$



HERE'AS A PROBLEM:



DO THROUGHPUT CAPABILITY CALCULATIONS

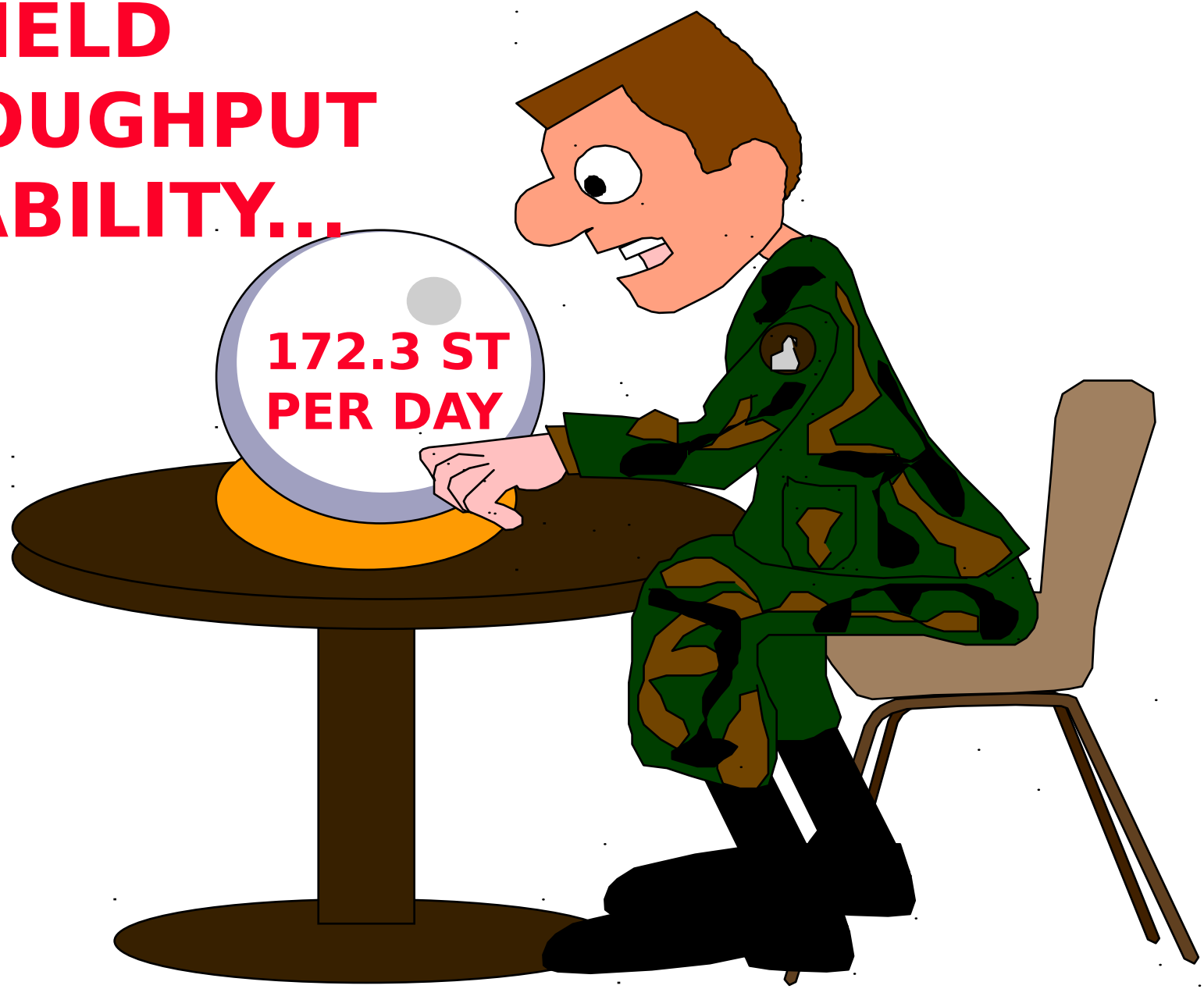
FOR A 24 HOUR AIRPORT THAT HAS A WORKING

MOG OF ONE 141 AIRCRAFT, AND A 85%

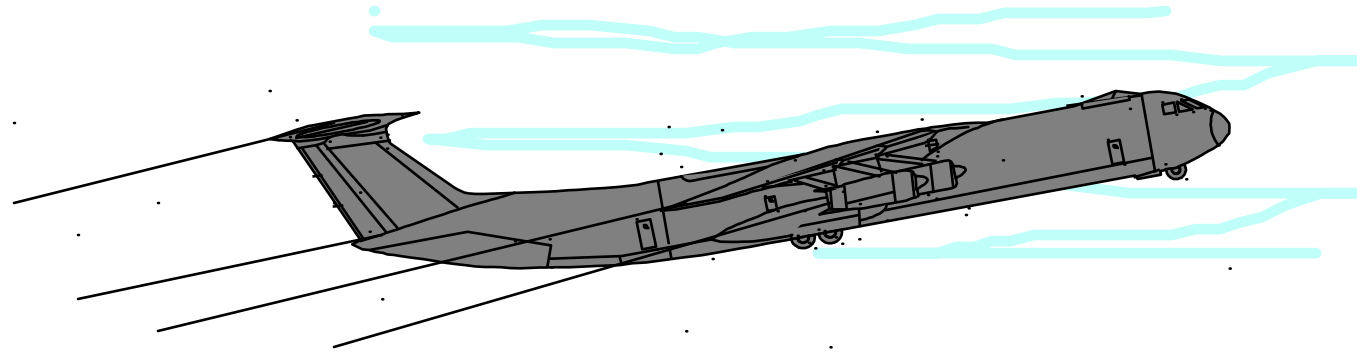
QUEUING EFFICIENCY

$$\frac{1 \times 19 \quad \text{AD} \quad 24 \quad \text{RS}}{2.25 \quad \text{ME}} \times 85\%$$

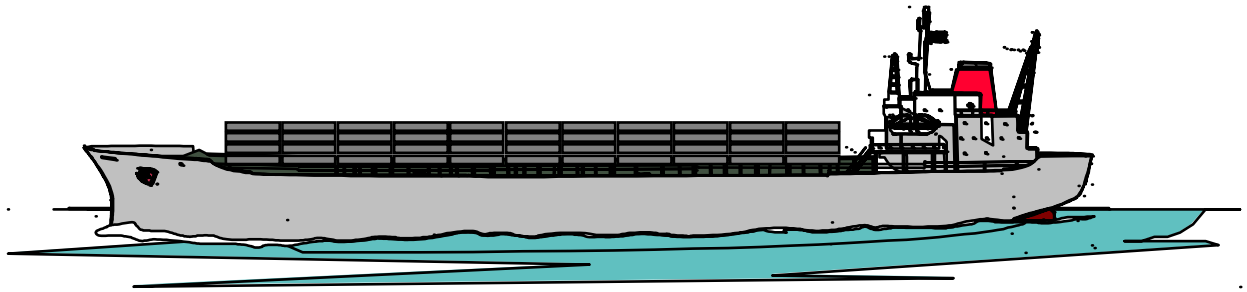
AIRFIELD THROUGHPUT CAPABILITY...



USMEDCOM



CALCULATIONS



STRADPC